Working Document to be presented to the Working Group on the
Biology and Assessment of Deep Sea Fisheries Resources

ICES WGDEEP, - Copenhagen 9-16 March 2009

Results on Argentine (*Argentina* spp.), Bluemouth (*Helicolenus dactylopterus*), Greater forkbeard (*Phycis blennoides*) and Spanish ling (*Molva macrophthalma*) from 2008 Porcupine Bank (NE Atlantic) survey

F. Velasco[1], M. Blanco[1], F. Baldó[1] & J. Gil[2]

Instituto Español de Oceanografía

(1)
Centro Oceanográfico de Santander
P.O. Box 240
39080 Santander, Spain
francisco.baldo@st.ieo.es

(2)
Unidad de Cádiz
Campus Universitario de Puerto Real
c/ República Saharaui, s/n
11519 Puerto Real, Cádiz, Spain

Abstract

This paper presents the results on four of the most important deep fish species of the last Porcupine Spanish survey carried in 2008, and updates the document presented in the previous year with the information on the first seven years (2001-2007) of the Porcupine Spanish surveys. The document presents total abundances in weight, length frequencies and geographical distributions for Argentina spp. (mostly A. silus), bluemouth, greater fork-beard and Spanish ling.

1. Introduction

Since 2001 a Spanish bottom trawl survey has been carried out annually in the areas surrounding the Porcupine Bank (ICES Divisions VIIc and VIIk) to study the distribution, relative abundance and biological parameters of commercial fish in the area (ICES, 2007). The main target species for this survey series are hake, monkfish, white anglerfish and megrim, which abundance indices are estimated by age (Velasco *et al*., 2005; Velasco *et al*., 2007). Nevertheless data are also collected for all the fish species captured, Norway lobster (*Nephrops norvegicus*) and other benthic invertebrates.

In 2008, a working document (Baldó et al. 2008) was presented to the WGDEEP summarizing the results on the most common deep water fish species caught in the Porcupine Survey, and the aim of the present working document is to update those results with the information obtained in last year's survey (abundance indices, length frequency distributions and geographic and bathymetric distributions). In the aforementioned document Spanish ling was assigned as *M. dypterigia*, but after the revisions in the taxonomy of the genus *Molva*, the *M. dypterigia dypterigia* and *M. dypterigia macrophthalma* were accepted as different species, being denominated blue ling as *Molva dypterygia*, and Spanish ling as *Molva macrophthalma*, (Queró. *et al*. 2003). The catches and information provided in Baldo *et al*. (2008) document have to be intended as this latter species.

2. Material and methods

The area covered in Porcupine surveys (Figure 1) is the Porcupine bank from longitude 12° W to 15° W and from latitude 51° N to 54° N. The survey covers depths between

180 and 800 m, and in 2008 was carried out between September the 12th and the 5th of October on board the R/V "Vizconde de Eza", the stern trawler of 53 m and 1800 Kw that has been used along this series.

The sampling design used in this survey is random stratified (Velasco and Serrano, 2003), with two geographical sectors (North and South) and three depth strata defined by the 300, 450 and 800 m isobaths, resulting in 5 strata, given that there are no grounds shallower than 300 m in the Southern sector (Figure 1). As described in 2008 Working Document on deep species in this survey (Baldó et al. 2008), sampling was random stratified and allocated proportionally to strata area using a buffered random sampling procedure (as proposed by Kingsley *et al*., 2004) to avoid the selection of adjacent 5×5 nm rectangles. The gear used was the Porcupine baca 40/52, described in ICES (2003), with 250 sweeps, 850 kg doors, 90 mm net mesh all along the gear and a and 20 mm liner covering the cod-end inner part.

Two different methods were used to estimate abundance variability: (i) the parametric standard error derived from the random stratified sampling (Grosslein and Laurec, 1982), and (ii) a non parametric bootstrap procedure implemented in R (R Development Core Team, 2008) resampling randomly with replacement stations within each stratum and maintaining the sampling intensity, and using 80% bootstrap confidence intervals from the 0.1 and 0.9 quantiles of the resultant distribution of bootstrap replicates (Efron and Tibshirani, 1993).

3. Results and discussion

In spite of using the same gear design as in previous years, in 2008 survey there were differences in the mean vertical and door spread of the gear during the survey, that decreased from 2.96 m in 2008 to 2.50±0.07 m for the vertical opening and increased from 131.7 m to 147.2±4.7 m for the door spread. The differences with previous years were not solved in spite of two gear changes and modifications in the doors rigging. These changes occurred together with a longer mean time to make ground contact, produced a decrease in the abundance indices of several species which relation to the gear behaviour has not been possible to evaluate for each species, and do not affect significantly the number of fish species caught: 103 fish species in 2008 compared with 97.4 fish species as a mean in the last 5 years.

In the four species considered there has been a decrease in abundance, which continues with the decreasing trend detected found in these species in the last three or four years, nevertheless the decreases in abundance in Argentine (Figure 2) and blue mouth (Figure 5) are within the ranges of last years estimates considering both parametric SE and bootstrap confidence intervals. On the other hand decreases in the abundance of greater forkbeard (Figure 8) and (Figure 11) Spanish ling are larger and remarkable in spite of the gear problems already stated.

Length distributions of Argentine (Figure 3), blue mouth (Figure 6) and Spanish ling (Figure 12) are very similar to those from last year with low abundances of small individuals (recruit or juveniles) for the three of them, these results are within the ranges of the results found for these species in this series, except in the case of Spanish ling, which presented a marked recruitment peak in 2004. In the case of greater fork-beard individuals smaller than 20 cm were not found at all (Figure 9), something that have not occurred in the previous years of the series, though recruitment peaks were very small in 2006 and 2007, and a large peak was only found in 2002 and could be tracked in the abundances caught in subsequent years.

Geographical distributions for the species (Figure 4: argentine, Figure 7: blue mouth, Figure 10: greater fork-beard; and Figure 13: Spanish ling) have the same patterns found in previous years, and considering the decreases already stated the only remarkable difference from lasts years is the low abundance of greater fork-beard in the south eastern part of the study area, where there were abundances comparable to the rest of the area in previous years and they are comparatively low in 2008.

4. Conclusions

The results of Porcupine bottom trawl survey in 2008 have been marked by the problems in the gear that have produced a reduction in the abundance indices difficult to evaluate, but bearing this in mind and comparing this year results with previous years Argentine and blue mouth seem to remain at same levels as in previous years while Spanish ling and greater forkbeard apparently continue a decay in abundances. The recruitments, or abundance of small individuals, are low as they had been in the last years what could be contributing to the decrease in abundance found in the four species studied.

5. References

Baldó, F.; Velasco, F.; Blanco, M. & Gil, J. 2008. Results on Argentine (Argentina spp.), Bluemouth (Helicolenus dactylopterus), Greater forkbeard (Phycis blennoides) and Blue ling (Molva dypterigia) from the 2001-2007 Porcupine Bank (NE Atlantic) bottom trawl surveys. WD presented to the ICES WGDEEP, Copenhagen 03-10 March 2008. 16 pp.

Efron and Tibshirani, 1983. An Introduction to the Bootstrap. Chapman & Hall 436 pp.

Grosslein M.D. and Laurec A., 1982. Bottom trawl survey design, operation and analysis. CECAF/ECAF Series 81/22. 22 pp.

ICES, 2003. Report of the Study Group on Survey Trawl Gear for the IBTS Western and Southern Areas. Vigo, 12-14 February 2003. ICES CM 2003/B:01. 22 pp.

ICES, 2007. Report of the International Bottom Trawl Surveys Working Group. Sete, France, 27-30 March 2007. ICES CM 2007/RMC:05. 182 pp.

Kingsley, M.C.S.; Kanneworff, P. and Carlsson, D.M., 2004. Buffered random sampling: a sequential inhibited spatial point process applied to sampling in a trawl survey for northern shrimp *Pandalus borealis* in West Greenland waters. *ICES Journal of Marine Science*, **61**: 12-24.

Quéro, J-C.; Vayne, J.J. et Porché, P. 2003. Guide des poissons de l'Atlantique européen. Les Guides du Naturaliste. Delachaux et Niestlé, Lonay, Switzerland. 465 p.

R Development Core Team. 2008. R: A language and environment for statistical computing. R Foundation for Statistical Computing, Vienna, Austria. ISBN 3-900051-07-0, URL http://www.R-project.org.

Velasco, F. and Serrano, A., 2003. Distribution patterns of bottom trawl faunal assemblages in Porcupine Bank: implications for Porcupine surveys stratification design. WD presented to the ICES IBTSWG, Lorient 25-28 March 2003. 19 pp.

Velasco, F.; Castro, J.; Fariña, C.; Piñeiro, C.G. & Sainza, M. 2005. Results on hake and *Nephrops* from the 2001-2004 Porcupine Bank bottom trawl surveys. WD presented to the ICES WGHMM, Lisbon 10-19 May 2005. 14 pp.

Velasco, F.; Landa, J.; Fontenla, J. and Barrado, J. 2007. Results on megrim (*Lepidorhombus whiffiagonis*) and anglerfish (*Lophius piscatorius*) from the

2001-2006 Porcupine Bank bottom trawl surveys. WD presented to the ICES WGHMM, Vigo 8-17 May 2007. 13 pp.

5. Tables and figures

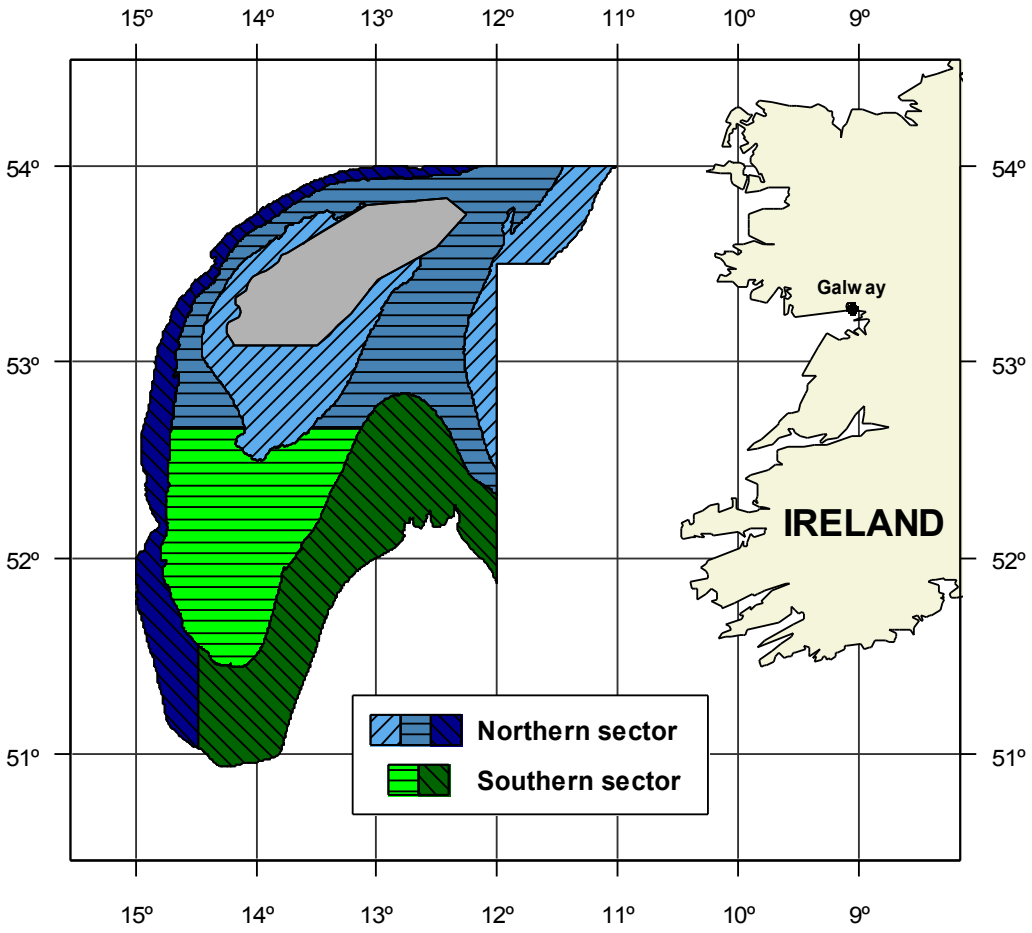

Figure 1. Stratification design used in Porcupine surveys from 2003. Depth strata are: A) shallower than 300 m, B) 301 – 450 m and C) 451 – 800 m. The grey area in the middle of Porcupine bank corresponds to a large non-trawlable area, not considered for area measurements and stratification.

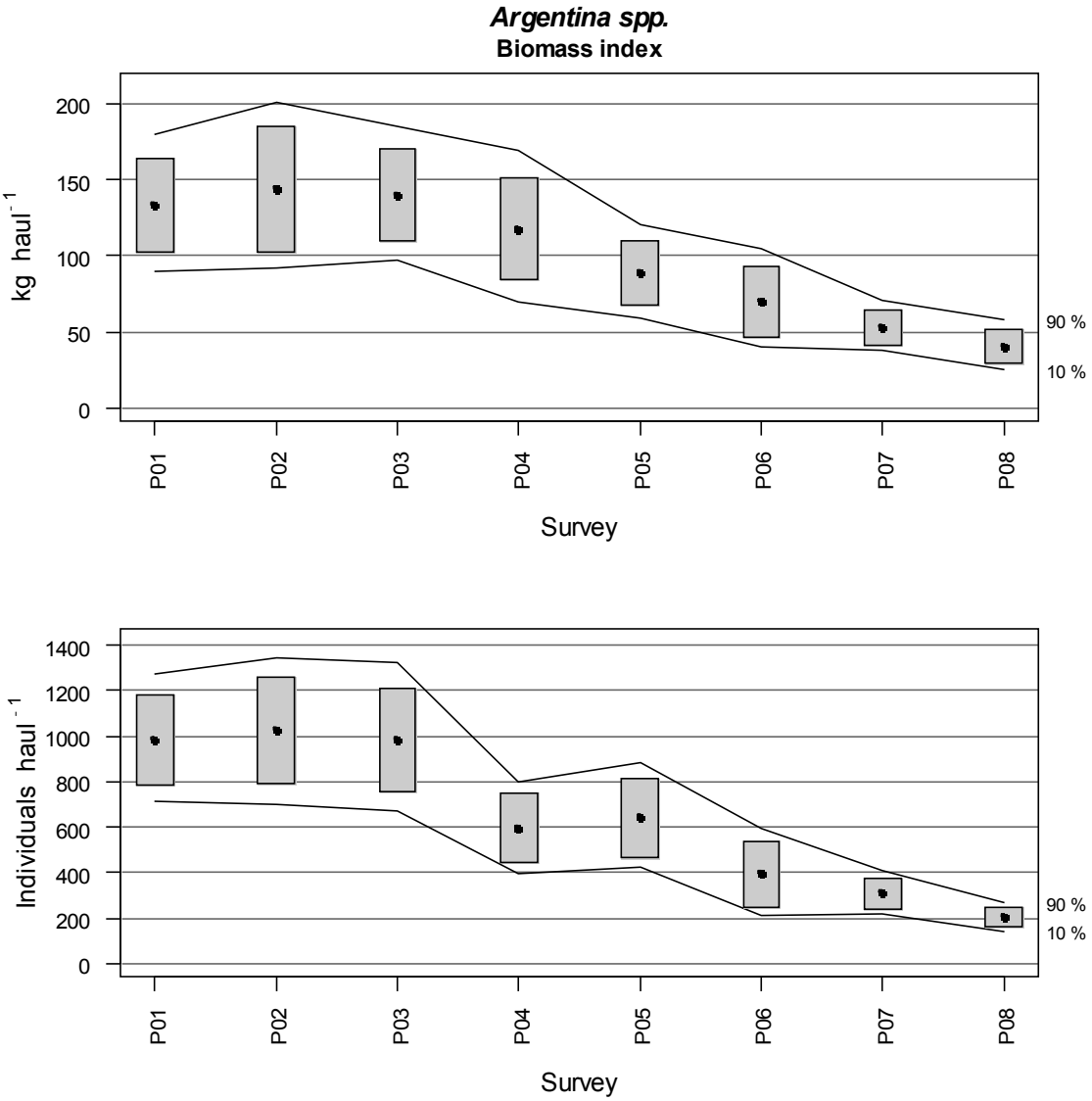

Figure 2. Changes in *Argentina* spp. (mainly *Argentina silus*) biomass and abundance indices during Porcupine Survey time series (2001-2008). Boxes mark parametric standard error of the stratified abundance index. Lines mark bootstrap confidence intervals (α = 0.80, bootstrap iterations = 1000)

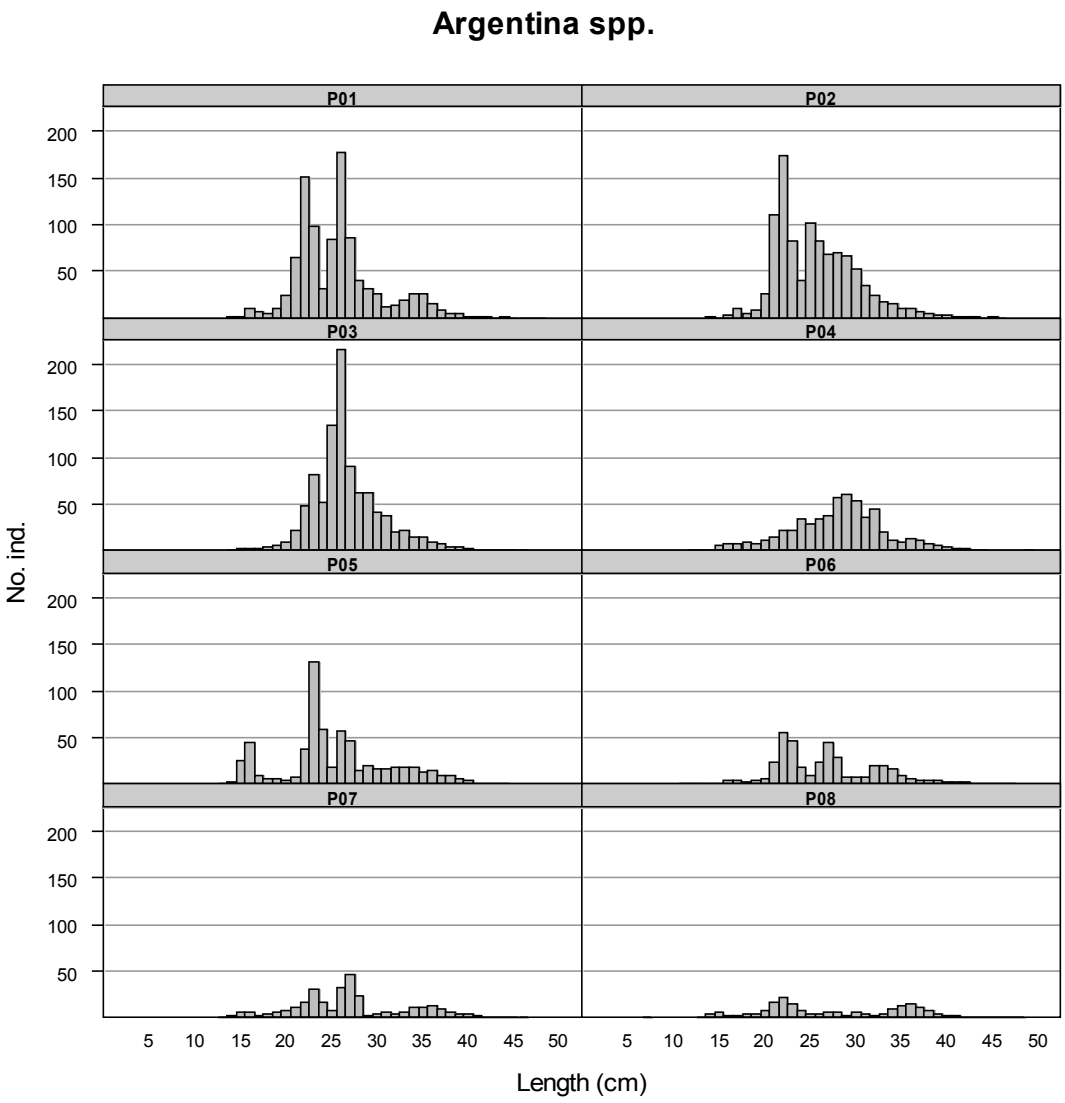

Figure 3. Mean stratified length distributions of *Argentina* spp. in Porcupine surveys (2001-2008)

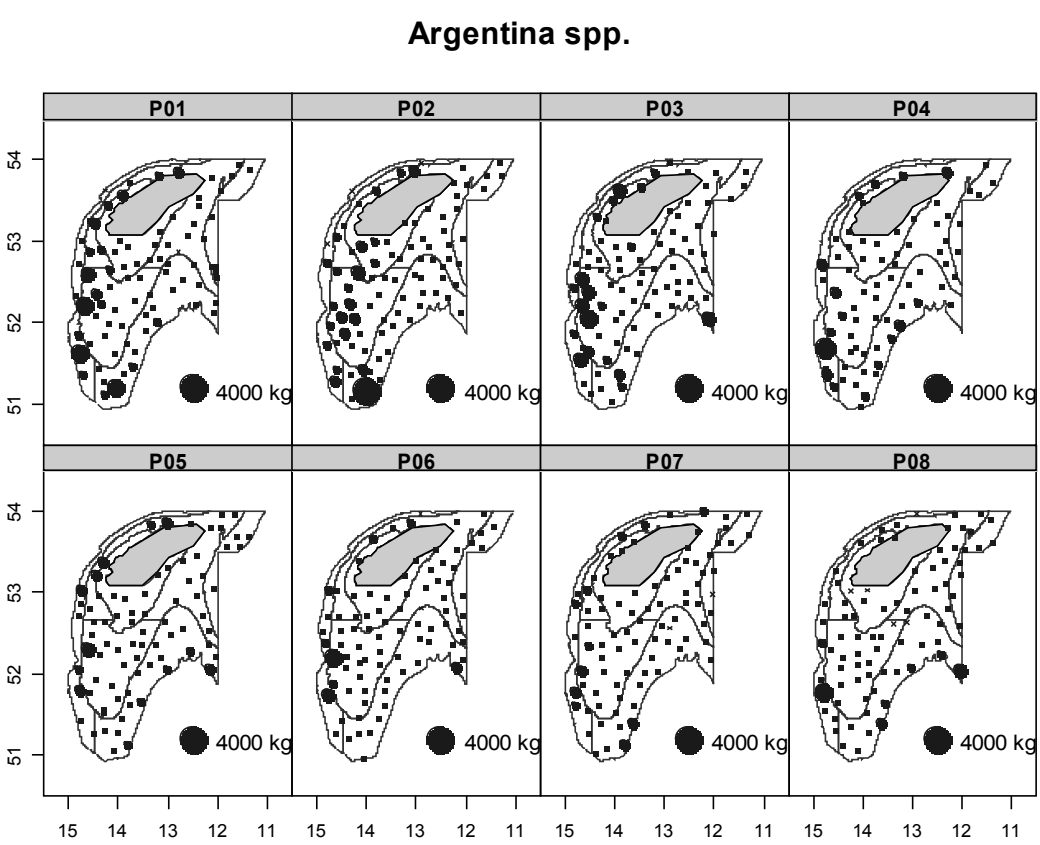

Figure 4. Geographic distribution of *Argentina* spp. catches (kg/30 min haul) in Porcupine surveys (2001-2008)

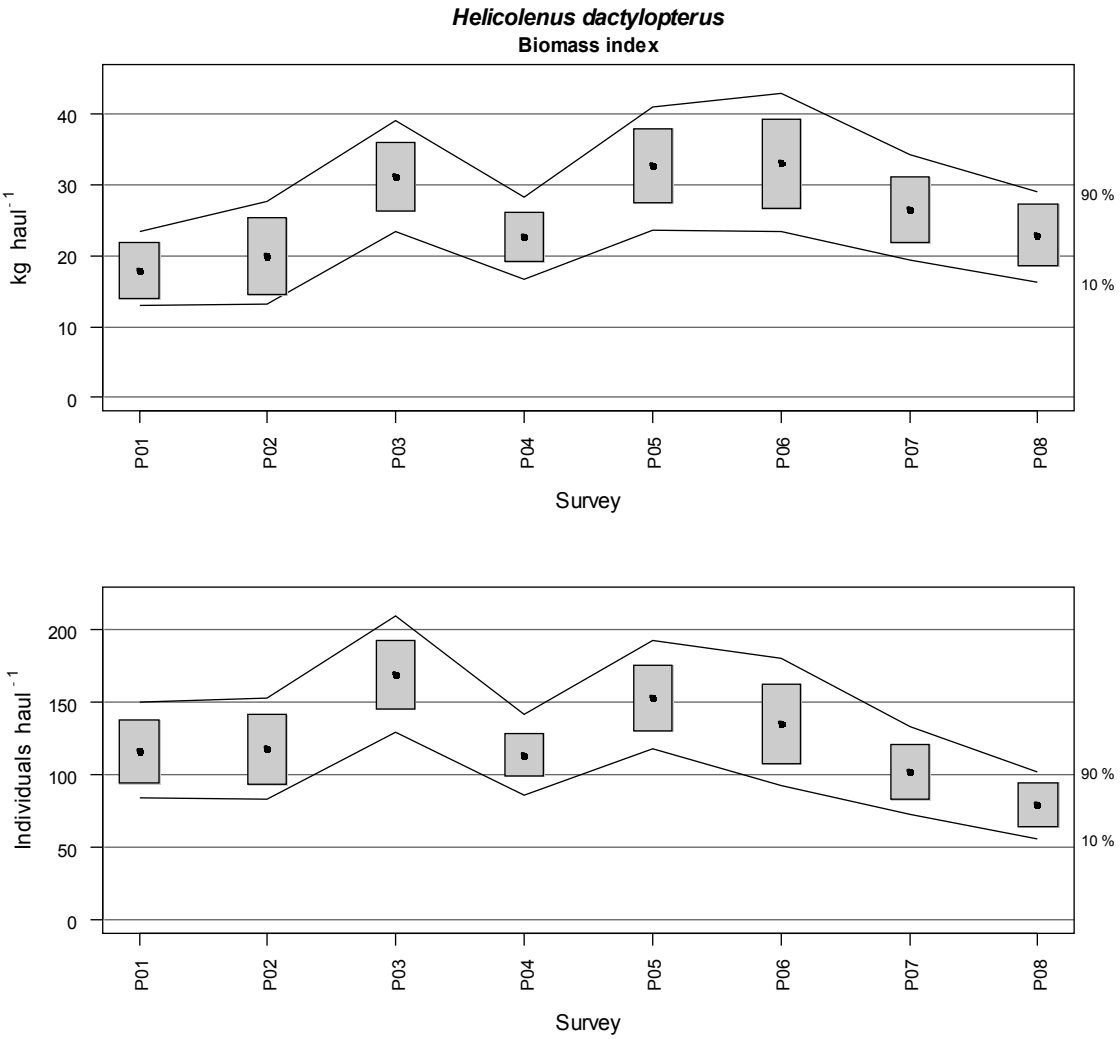

Figure 5. Changes in *Helicolenus dactylopterus* biomass and abundance indices during Porcupine Survey time series (2001-2008). Boxes mark parametric standard error of the stratified abundance index. Lines mark bootstrap confidence intervals ($\alpha = 0.80$, bootstrap iterations = 1000)

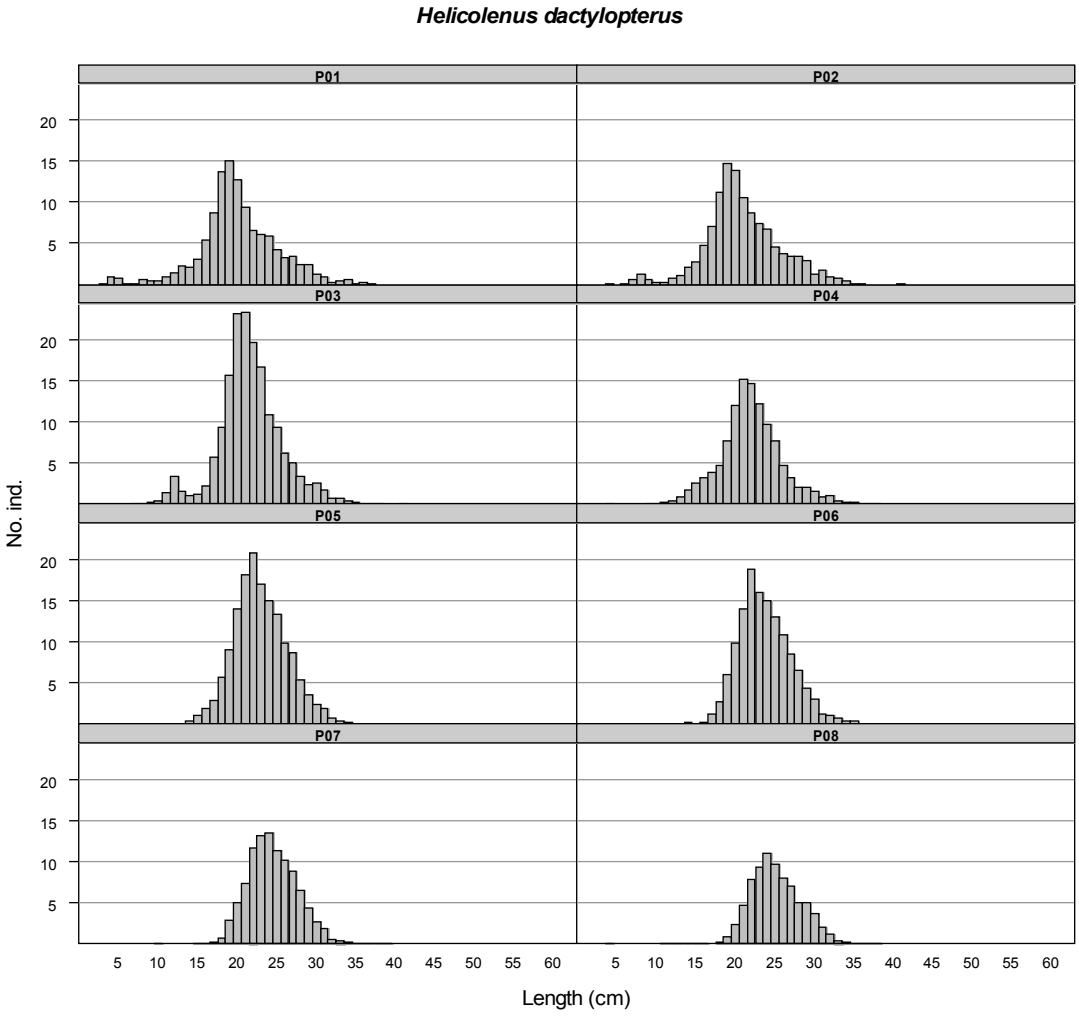

Figure 6. Mean stratified length distributions of *Helicolenus dactylopterus* in Porcupine surveys (2001-2008)

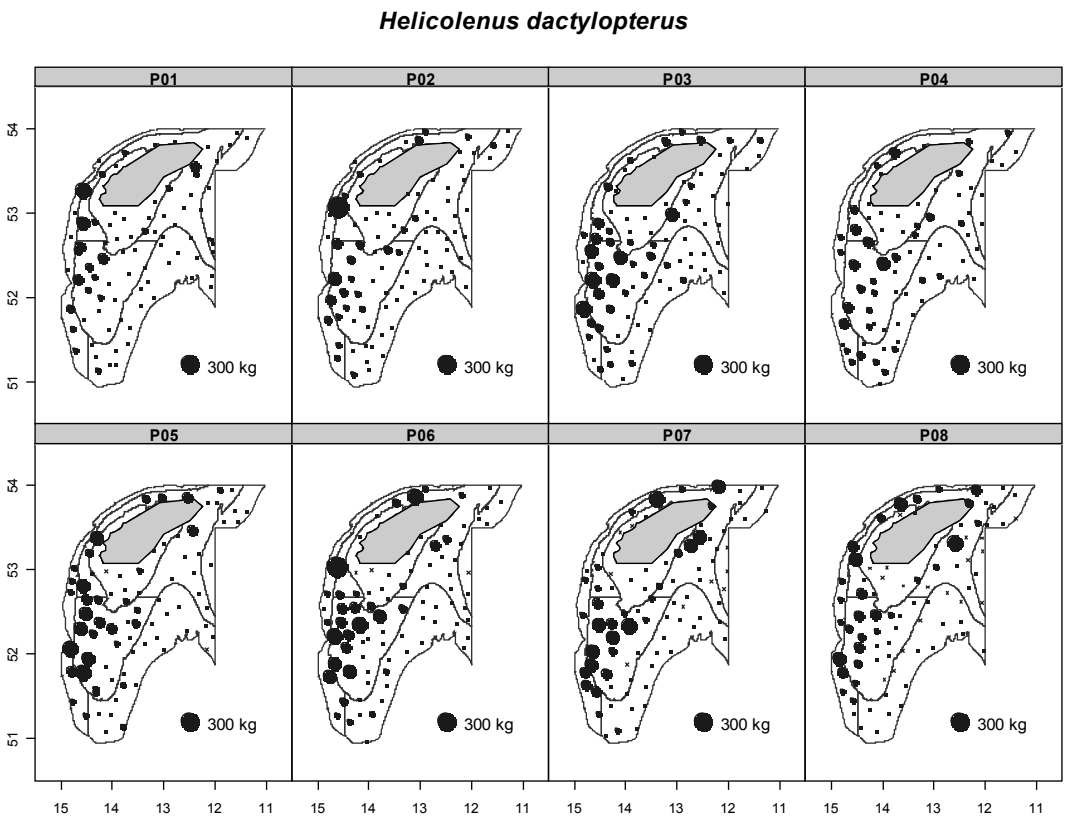

Figure 7. Geographic distribution of *Helicolenus dactylopterus* catches (kg/30 min haul) in Porcupine surveys (2001-2008)

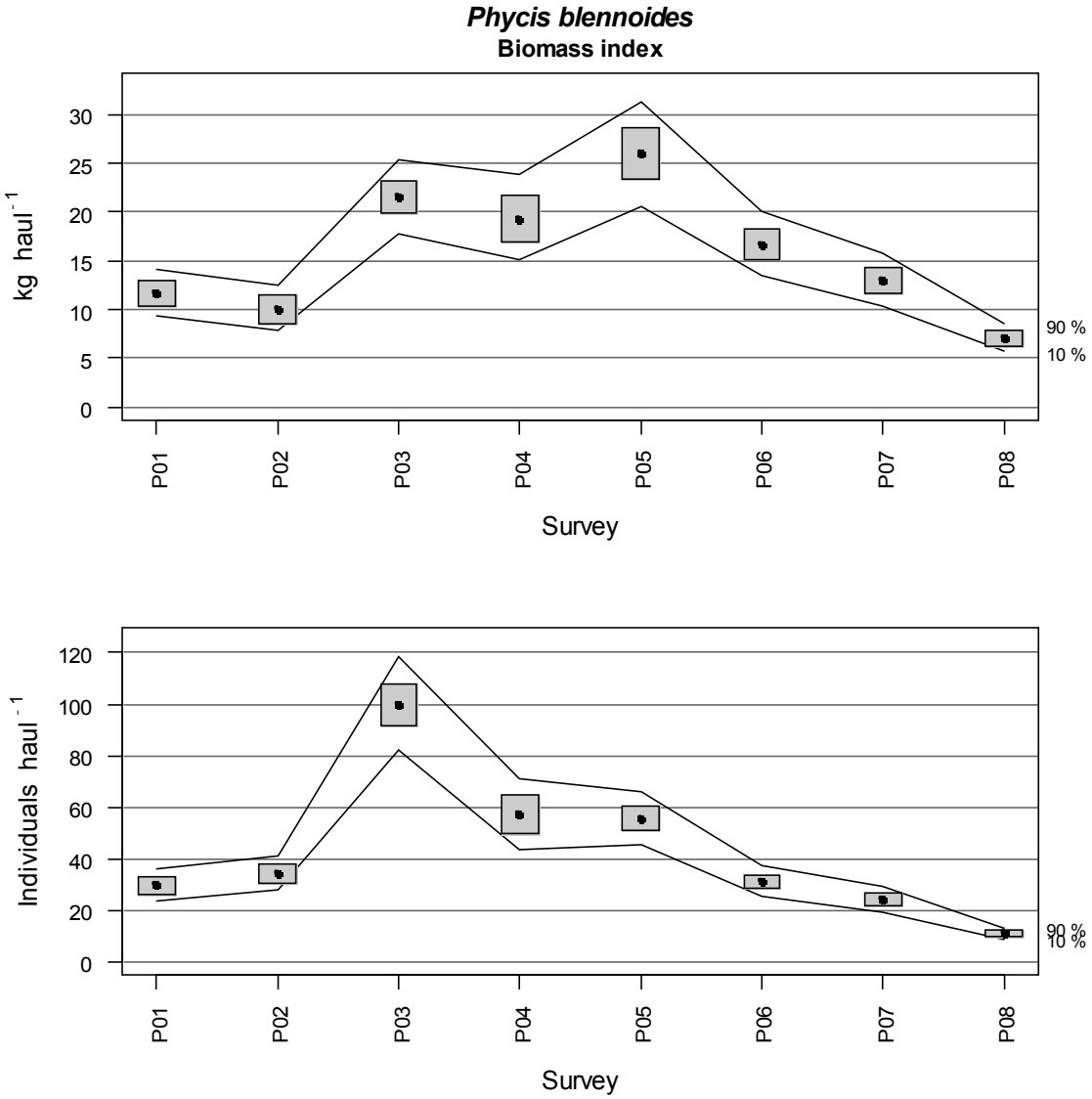

Figure 8. Changes in *Phycis blennoides* biomass and abundance indices during Porcupine Survey time series (2001-2008). Boxes mark parametric standard error of the stratified abundance index. Lines mark bootstrap confidence intervals ($\alpha = 0.80$, bootstrap iterations = 1000).

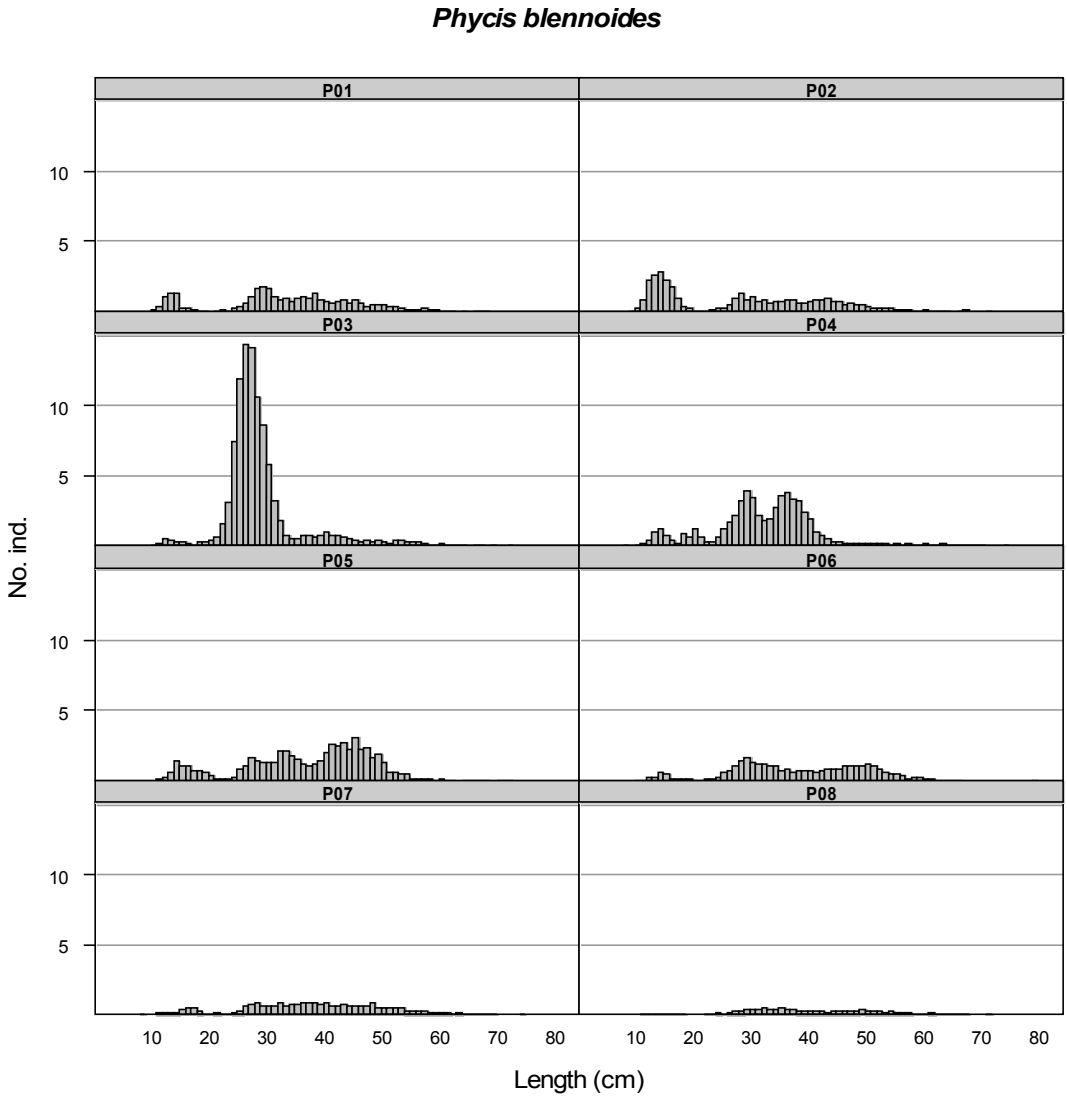

Figure 9. Mean stratified length distributions of *Phycis blennoides* in Porcupine surveys (2001-2008)

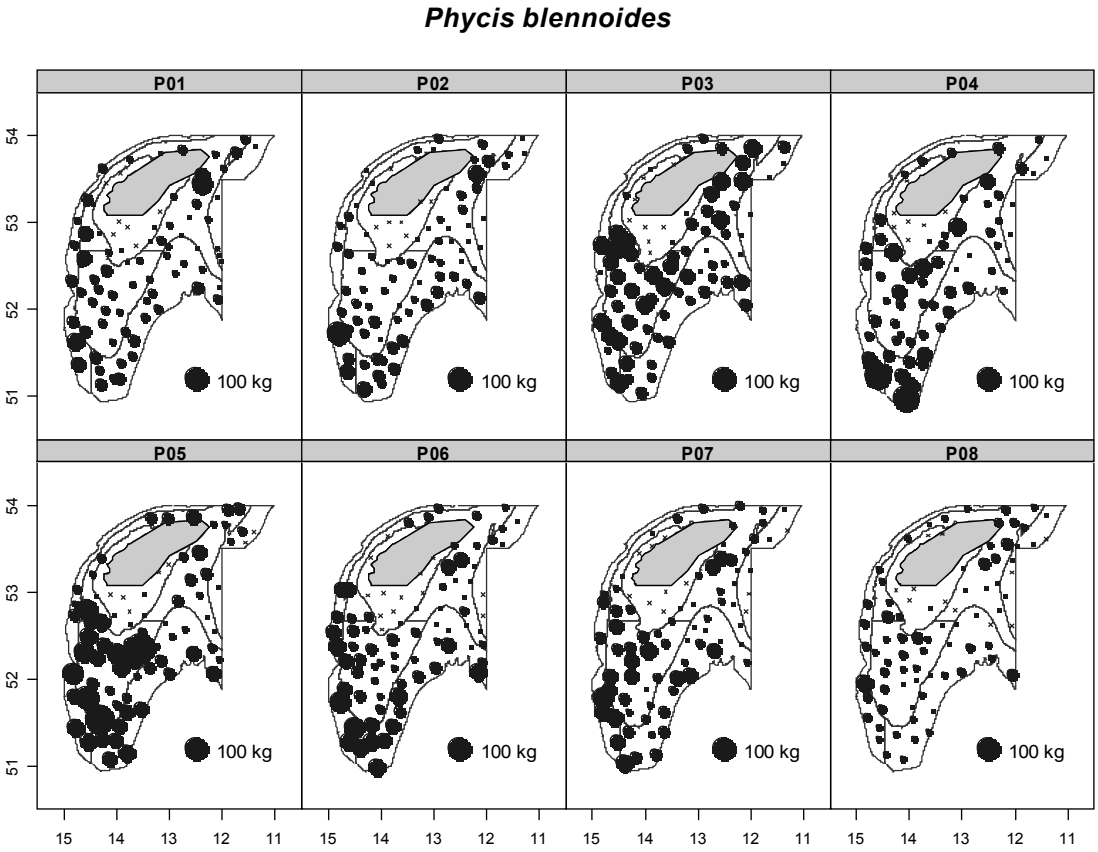

Figure 10. Geographic distribution of *Phycis blennoides* catches (kg/30 min haul) in Porcupine surveys (2001-2008)

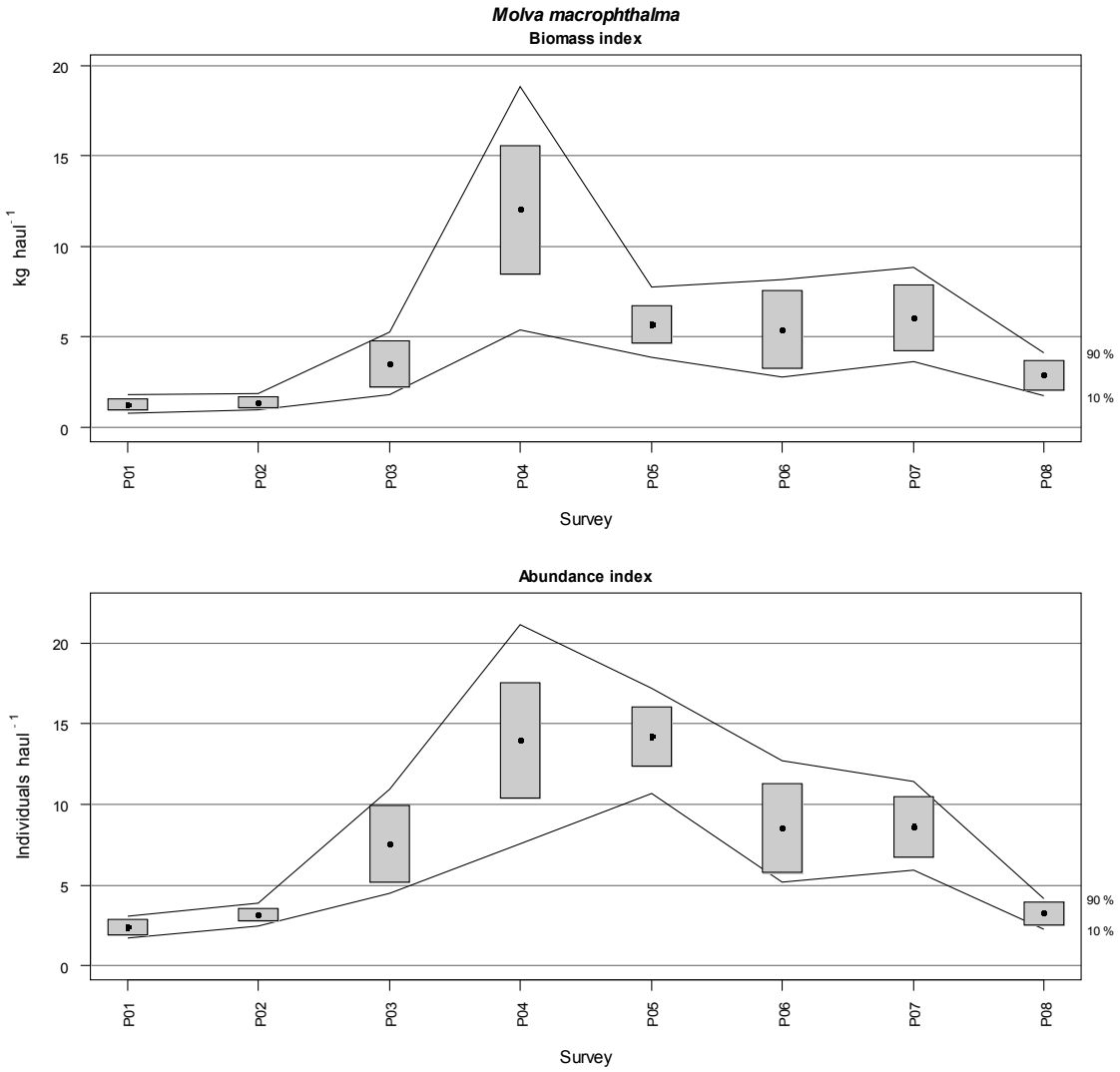

Figure 11. Changes in *Molva macrophthalma* biomass and abundance indices during Porcupine Survey time series (2001-2008). Boxes mark parametric standard error of the stratified abundance index. Lines mark bootstrap confidence intervals ($\alpha = 0.80$, bootstrap iterations = 1000).

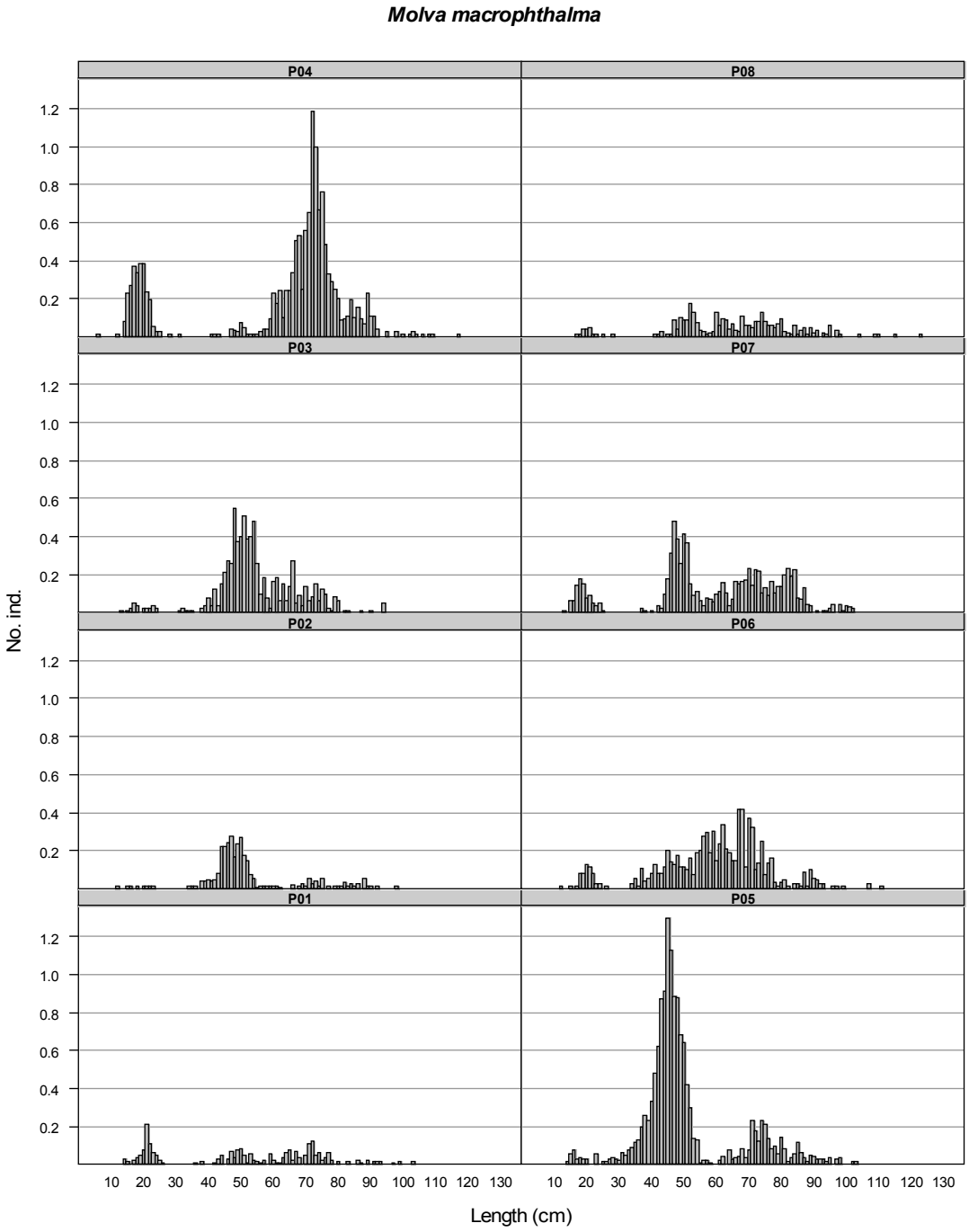

Figure 12. Mean stratified length distributions of *Molva macrophthalma* in Porcupine surveys (2001-2008)

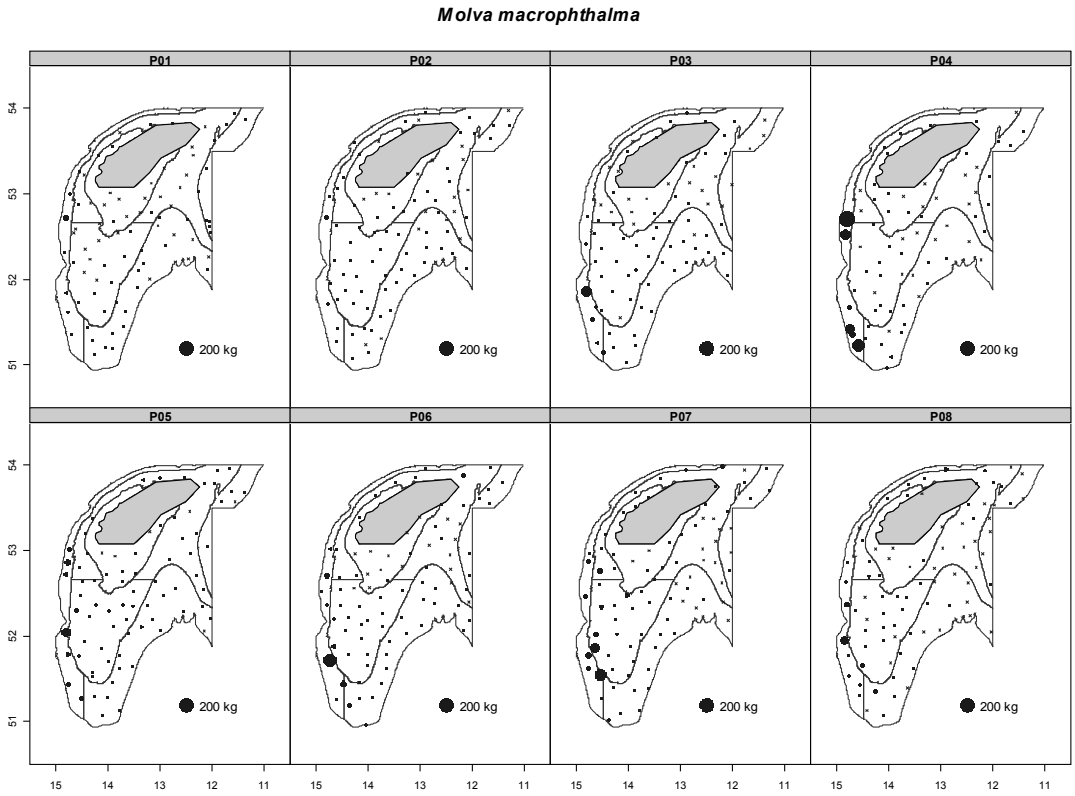

Figure 13. Geographic distribution of *Molva macrophthalma* catches (kg/30 min haul) in Porcupine surveys (2001-2008).